(IWM – 8) Gross Crop Irrigation Water Requirement GUIDE

	Steps to Calculate the Crop Irrigation Water Requirement	Enter Results	Example Calculation (Alfalfa)	Results	NM IWM Manual References & Notes:
STEP 1	**Fc = ECe(ct)/ECiw** Fc = Ratio of the Crop Threshold Salinity ($ECe_{(ct)}$) to the Electrical Conductivity of irrigation water (ECiw). Units: dS/m		**Fc = 2.0/1.0 =** Alfalfa ECe(ct) = 2.0 dS/m ECiw = 1.0 dS/m	**2.0**	➢ Crop Salt Tolerance Table for NM ➢ Irrigation Water Quality Sampling
STEP 2	**LF = 0.3086/$Fc^{1.702}$** LF = Leaching Fraction (for conventional irrigation; e.g. surface irrigation).		**LF =** LF = 0.3086/$2.0^{1.702}$ LF = 0.3086/3.254	**0.095**	➢ Salinity Assessment GUIDE for Selected Crops
STEP 3	**NIR = ETc/(1 – LF)** NIR = Net Irrigation Requirement (in.) ETc = Crop Evapotranspiration (in.)		**NIR =** NIR = 40.01/(1 – 0.095) NIR = 40.01/0.905 ETc = 40.01 inches for Alfalfa	**44.21”**	➢ NM Crop Consumptive Use Requirements (NRCS FOTG – Section 1: Irrigation Guide for NM)
STEP 4	**Ea = Irrigation needed (in.) ÷ Irrigation applied (in.)** Ea = Irrigation Application Efficiency		**Ea =** Ea = 2.06/2.5 2.06” (Irr. needed) ÷ 2.5” (Irr. applied) Irr. applied: 7.5 (cfs) x 2.0 (hrs.) ÷ 6.0 (acres) = 2.5” applied.	**0.824 (82.4%)**	➢ Irrigation Water Req. Guide (e.g. 3’ root zone & Silt Loam soil @ 10% LF = 2.06” needed) ➢ QT = DA Calculations for Assessing IWM Requirements
STEP 5	**Fg = NIR/Ea** Fg = Gross Irrigation Application needed		**Fg =** Fg = 44.21/0.824	**53.7”**	➢ The calculation of Fg is used in the Planning & Design of Irrigation Systems and the development of IWM Plans
STEP 6	**(# Irr. /yr.) x (in. applied/Irr.) = Total in. applied/ac./yr.** (Note: in. applied/Irr. is based on an avg.)		**13 Irrigations x avg. of 2.5”/Irr. =** (e.g., Irrigated field approximately every 2-wks on a fixed schedule (Apr. – Oct.)	**32.5”**	➢ Amount of Irr. Water applied can differ substantially from the planned Gross Irrigation application needed
STEP 7	**Fg – (Total in. applied/ac./yr.) =** (Note: evaluate reason(s) for the difference between Fg & Total in. applied/ac./yr.)		**53.7” (Fg) – 32.5” (Total in. applied/ac./yr.) =**	**21.2”**	➢ In this example, it is clear that consumptive use is not being met.

ECe(ct) is taken from a soil saturation extract & the ECiw value is taken from a water test (EC units: dS/m = mmhos/cm = mS/cm).

The LF equation used for High Frequency Irrigation is: LF = $0.1794/Fc^{3.0417}$ (e.g. Drip irrigation)

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